

No.

200200177



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR PLANT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 U.S.C. 2131-2141, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN, FIELD

'PH5FW'



In Testimony Whereof, I have herunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this first day of July, in the year two thousand and four.

Attest:

Commissioner

*Plant Variety Protection Office
Agricultural Marketing Service*



Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER Pioneer Hi-Bred International, Inc.		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER 		3. VARIETY NAME PH5FW	
4. ADDRESS (Street and No. or RFD No., City, State and Zip Code, and Country) 7301 NW 62nd Avenue P.O. Box 85 Johnston, IA 50131-0085		5. TELEPHONE (include area code) 515/270-4051		<div style="border: 1px solid black; padding: 2px;"> FOR OFFICIAL USE ONLY PVPO NUMBER <div style="font-size: 1.5em; font-weight: bold;">200200177</div> </div>	
6. FAX (include area code) 515/253-2125		7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) Corporation		8. IF INCORPORATED, GIVE STATE OF INCORPORATION IOWA	
9. DATE OF INCORPORATION March 5, 1999		10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION (FIRST PERSON LISTED WILL RECEIVE ALL PAPERS) Steven R. Anderson Research and Product Development P.O. Box 85 Johnston, IA 50131-0085		<div style="border: 1px solid black; padding: 2px;"> FILING & EXAMINATION FEES: \$ 2705.00 DATE 6/6/02 CERTIFICATION FEE: \$ 432.00 DATE 6/18/04 </div>	
11. TELEPHONE (include area code) 515/270-4051	12. FAX (include area code) 515/253-2125	13. E_MAIL <u>Steven.Anderson@Pioneer.com</u>		14. CROP KIND NAME (Common name) CORN	
15. GENUS AND SPECIES NAME OF CROP Zea Mays		16. FAMILY NAME (Botanical) Gramineae		17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
18. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety d. <input type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,705), made payable to "Treasurer of the United States" (Mail to Plant Variety Protection Office)			19. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? See Section 83(a) of the Plant Variety Protection Act) <input type="checkbox"/> YES (If "yes", answer items 20 and 21 below) <input checked="" type="checkbox"/> NO (If "no", go to item 22)		
20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? <input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES" WHICH CLASSES? <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED			21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES" SPECIFY THE? <input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED Number 1,2,3 etc. (If additional explanation is necessary, please use the space indicated on the reverse.)		
22. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U.S. OR OTHER COUNTRIES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse)			23. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)		
24. The owner(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate. The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Owner(s) is(are) informed that false representation herein can jeopardize protection and results in penalties.					
SIGNATURE OF OWNER 			SIGNATURE OF OWNER 		
NAME (Please print or type) Steven R. Anderson			NAME (Please print or type) Steven R. Anderson		
CAPACITY OR TITLE Research Scientist		CAPACITY OR TITLE Research Scientist		DATE 5-15-02	

INSTRUCTIONS

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GENERAL: To be effectively filed with the Plant Variety protection Office (PVPO), ALL of the following items must be received in the PVPO: (1) Completed application form signed by the owner; (2) completed Exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to reproduce the variety, or for tuber reproduced varieties verification that a viable (in the sense that it will reproduce an entire plant) tissue culture will be deposited and maintained in a approved public repository; (4) check drawn on a U.S. bank for \$2705 (\$320 filing fee and \$2,385 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice.) Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfilled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 400, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. Retain one copy for your files. All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. DO NOT use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of \$320 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office

Telephone: (301)504-5518

FAX: (301)504-5291

Homepage: <http://www.ams.usda.gov/science/pvp.htm>

ITEM

- 18a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified.
- 18b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens of photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 18c. Exhibit C forms are available from the PVPO for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 18d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant disease resistance, etc.
- 18e. Section 52(5) of the Act required applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
19. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant MAY NOT reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, applicant may change the choice. (See Regulations and Rules of Practice, Section 7.103).
22. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
23. See Section 5.5 of the Act for instructions on claiming the benefit of an earlier filing date
21. CONTINUED FROM FRONT (*Please provide a statement as to the limitation and sequence of generations that may be certified.*)

22. CONTINUED FROM FRONT (*Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.*)

France, Germany, Belgium, Luxembourg, Netherlands, Switzerland Nov. 1, 1999; Austria, Italy Nov.1, 2000; Japan, Canada, United States, Poland, Slovakia, Ukraine, Nov. 1, 2001

23. CONTINUED FROM FRONT (*Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).*)

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. There is no charge for filing a change of address. The fee for filing a change of ownership or assignment or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of Regulations and Rules of Practice.)

To avoid conflict with other variety names in use, the applicant should check the variety names proposed by contacting: Seed Branch, AMS, USDA, Room 213, Building 306, Beltsville Agricultural Research Center—East, Beltsville, MD 20705. Telephone: (301) 504-8089. <http://www.ams.usda.gov/lsg/seed/lsg-sd.htm>

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this collection of information is 10582-005. The time required to complete this information collection is estimated to average 1.4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs). Persons with disabilities who require alternative means for communication of program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202) 720-2791. To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C. 20250, or call (202) 720-7327 (voice) or (202) 720-1127 (TDD). USDA is an equal employment opportunity employer.

Exhibit A. Origin and Breeding History

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Pedigree: D149/D171)XA9K62K54K23K3X

Pioneer Line PH5FW, *Zea mays* L., a flint, corn inbred, was developed by Pioneer Hi-Bred International, Inc. by crossing (D171) X (D149) and using the pedigree method of plant breeding. Selfing was practiced from the above population for 10 generations using pedigree selection. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Betton-FR, as well as other Pioneer research locations. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations again made for uniformity.

Variety PH5FW has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". It has been self-pollinated and ear-rowed 10 generations with careful attention paid to selection criteria and uniformity of plant type to assure genetic homozygosity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity and stability, and for 7 generations during the final stages of inbred development and seed multiplication. Very high standards for genetic purity have been established morphologically using field observations and electrophoretically using sound lab molecular marker methodology.

No variant traits have been observed or are expected in PH5FW.

The criteria used in the selection of PH5FW were yield, both per se and in hybrid combinations; late season plant health, grain quality, stalk lodging resistance, and kernel size, especially important in production. Other selection criteria include: ability to germinate in adverse conditions; disease and insect resistance; pollen yield and tassel size.

* Varieties D171 and D149 were from the University of Hohenheim in Germany (Universität Hohenheim, D-70593 Stuttgart, Germany).

Exhibit A: Developmental history for PH5FW**200200177**

Season/Year Pedigree Grown	Inbreeding Level of Pedigree Grown
Oct/1992 D149 (male)	F0
Oct/1992 D171 (female)	F0
Oct/1993 D149/D171	F1
May/1994 D149/D171)X	F2
Oct/1995 D149/D171)XA9	F3
May/1996 D149/D171)XA9K6	F4
Nov/1996 D149/D171)XA9K62	F5
May/1997 D149/D171)XA9K62K5	F6
Nov/1997 D149/D171)XA9K62K54	F7
May/1998 D149/D171)XA9K62K54K2	F8
Nov/1998 D149/D171)XA9K62K54K23	F9
Nov/1999 D149/D171)XA9K62K54K23K3	F10
Oct/2000 D149/D171)XA9K62K54K23K3X	F11

*PH5FW was selfed and ear-rowed from F2 through F10 generation.

#Uniformity and stability were established from F5 through F10 generation and beyond when seed supplies were increased.

Exhibit B: Novelty Statement

Variety PH5FW mostly resembles Pioneer Hi-Bred International, Inc. proprietary inbred line PH36E (PVP Certificate No. 200100023). Tables 1A and 1B show two sample t-tests on data collected primarily in Johnston, Ankeny, and Dallas Center, IA. The traits collectively show measurable differences between the two varieties.

Exhibit B: Novelty Statement

Variety PH5FW has more primary tassel branches (7.2 vs 2.1) than variety PH36E (Table 1A, 1B).

Variety PH5FW has a smaller ear diameter (32.4mm vs 36.8mm) than variety PH36E (Table 1A, 1B).

Variety PH5FW has fewer kernel rows/ear (12.4 vs 14.4) than variety PH36E (Table 1A, 1B).

Variety PH5FW has a smaller cob diameter (20.3mm vs 24.2mm) than variety PH36E (Table 1A, 1B).

Variety PH5FW has a greater plant height (158.1cm vs 130.8cm) than variety PH36E (Table 1A, 1B).

Variety PH5FW has a greater ear height (55.4cm vs 39.5cm) than variety PH36E (Table 1A, 1B).

Exhibit B: Novelty Statement Tables

Table 1A: Data from Johnston, Ankeny, and Dallas Center, IA broken out by year and across environments are supporting evidence for differences between PH5FW and PH36E. Each year varieties were grown in 3 locations that had different environmental conditions. Environments had different planting dates and were in different fields. A two-sample t-test was used to compare differences between means.

TRAFF	year	variety	variety	Count	Count	Mean	Mean	Mean Diff	StdDeviation	StdDeviation	StdError	StdError	DF	t-value	Pooled
		1	2	1	2	1	2		1	2	1	2	Pooled		
cob diameter (mm)	2000	PH5FW	PH36E	15	15	20.1	23.0	-2.9	1.356	1.852	0.350	0.478	28	-4.8	0.000
cob diameter (mm)	2001	PH5FW	PH36E	15	15	20.5	25.3	-4.9	1.457	1.633	0.376	0.422	28	-8.6	0.000
ear diameter (mm)	2000	PH5FW	PH36E	15	15	31.7	35.1	-3.3	1.792	2.154	0.463	0.556	28	-4.6	0.000
ear diameter (mm)	2001	PH5FW	PH36E	15	15	33.1	38.5	-5.4	1.302	1.767	0.336	0.456	28	-9.5	0.000
ear height (cm)	2000	PH5FW	PH36E	15	15	59.6	42.9	16.7	10.473	5.963	2.704	1.540	28	5.4	0.000
ear height (cm)	2001	PH5FW	PH36E	15	15	51.1	36.1	15.0	7.367	7.472	1.902	1.929	28	5.5	0.000
ear row number	2000	PH5FW	PH36E	15	15	12.4	14.7	-2.3	1.549	1.234	0.400	0.319	28	-4.4	0.000
ear row number	2001	PH5FW	PH36E	15	15	12.4	14.1	-1.7	1.121	0.915	0.289	0.236	28	-4.6	0.000
plant height (cm)	2000	PH5FW	PH36E	15	15	168.6	135.4	33.2	11.612	8.218	2.998	2.122	28	9.0	0.000
plant height (cm)	2001	PH5FW	PH36E	15	15	147.5	126.1	21.4	13.174	7.726	3.401	1.995	28	5.4	0.000
tassel primary branch															
(# of primary															
branches)	2000	PH5FW	PH36E	15	15	8.5	1.7	6.8	2.615	1.387	0.675	0.358	28	8.9	0.000
tassel primary branch															
(# of primary															
branches)	2001	PH5FW	PH36E	15	15	5.9	2.5	3.4	2.031	1.302	0.524	0.336	28	5.5	0.000

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Exhibit B. Novelty Statement Tables

Table 1B: Summary data from Johnston, Ankeny, and Dallas Center, IA across years and environments are supporting evidence for differences between PH5FW and PH36E. Environments had different planting dates and were in different fields. A two-sample t-test was used to compare differences between means.

TRAIT	Variety		Count		Mean		Mean Diff		StdDeviation		StdError		DF		t-Value		Prob (2-tail)	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	Pooled	Pooled	Pooled	Pooled
tassel primary branch (# of primary branches)	PH5FW	PH36E	30	30	7.2	2.1	5.1	2.670	1.373	0.488	0.251	58	9.3	0.000				
ear diameter (mm)	PH5FW	PH36E	30	30	32.4	36.8	-4.4	1.695	2.618	0.310	0.478	58	-7.7	0.000				
ear row number	PH5FW	PH36E	30	30	12.4	14.4	-2.0	1.329	1.102	0.243	0.201	58	-6.3	0.000				
cob diameter (mm)	PH5FW	PH36E	30	30	20.3	24.2	-3.9	1.393	2.086	0.254	0.381	58	-8.4	0.000				
plant height (cm)	PH5FW	PH36E	30	30	158.1	130.8	27.3	16.237	9.145	2.965	1.670	58	8.0	0.000				
ear height (cm)	PH5FW	PH36E	30	30	55.4	39.5	15.9	9.884	7.473	1.805	1.364	58	7.0	0.000				

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United States Department of Agriculture, Agricultural Marketing Service
Science Division, Plant Variety Protection Office
National Agricultural Library Building, Room 500
Beltsville, MD 20705

Objective Description of Variety
Corn (*Zea mays* L.)

Name of Applicant (s) Pioneer Hi-Bred International, Inc.	Variety Seed Source	Variety Name or Temporary Designation PH5FW
Address (Street & No., or RFD No., City, State, Zip Code and Country) 7301 NW 62nd Avenue, P.O. Box 85, Johnston, Iowa 50131-0085		FOR OFFICIAL USE PVP0 Number 200200177
Place the appropriate number that describes the varietal characters typical of this inbred variety in the spaces below. Right justify whole numbers by adding Leading zeroes if necessary. Completeness should be striven for to establish an adequate variety description. Traits designated by an '*' are considered Necessary for an adequate variety description and must be completed.		
COLOR CHOICES (Use in conjunction with Munsell color code to describe all color choices: describe #25 and #26 in Comments section):		
01=Light Green	06=Pale Yellow	11=Pink
02=Medium Green	07=Yellow	12=Light Red
03=Dark Green	08=Yellow Orange	13=Cherry Red
04=Very Dark Green	09=Salmon	14=Red
05=Green-Yellow	10=Pink-Orange	15=Red & White
		16=Pale Purple
		17=Purple
		18=Colorless
		19=White
		20=White Capped
		21=Buff
		22=Tan
		23=Brown
		24=Bronze
		25=Variegated (Describe)
		26=Other (Describe)
STANDARD INBRED CHOICES		
(Use the most similar (in background and maturity) of these to make comparisons based on grow-out trial data):		
Yellow Dent Families:	Yellow Dent (Unrelated):	Sweet Corn:
Family Members	Co109, ND246,	C13, Iowa5125, P39, 2132
B14 CM105, A632, B64, B68	Oh7, T232,	
B37 B37, B76, H84	W117, W153R,	Popcorn:
B73 N192, A679, B73, NC268	W18BN	SG1533, 4722, HP301, HP7211
C103 Mo17, Va102, Va35, A682		
Oh43 A619, MS71, H99, Va26	White Dent:	Pipecorn:
WF9 W64A, A554, A654, Pa91	C166, H105, Ky228	Mo15W, Mo16W, Mo24W

Groups on Lynx/Osborn/Gunst/98-99PVP

EXHIBIT C: PH5FW

1. TYPE: (describe intermediate types in Comments section): <u>3</u> 1=Sweet 2=Dent 3=Flint 4=Flour 5=Pop 6=Ornamental			Standard Variety Name <u>CM105</u>			
2. REGION WHERE DEVELOPED IN THE U.S.A.: <u>3</u> 1=Northwest 2=Northcentral 3=Northeast 4=Southeast 5=Southcentral 6=Southwest 7=Other			Standard Seed Source <u>AMES 19315</u>			
3. MATURITY (In Region of Best Adaptability; show Heat Unit formula in 'Comments' section) DAYS HEAT UNITS <u>060</u> <u>1,099.0</u> From emergence to 50% of plants in silk <u>059</u> <u>1,090.0</u> From emergence to 50% of plants in pollen <u>003</u> <u>0,065.7</u> From 10% to 90% pollen shed From 50% silk to optimum edible quality From 50% silk to harvest at 25% moisture			DAYS HEAT UNITS <u>065</u> <u>1,235.5</u> <u>064</u> <u>1,205.0</u> <u>003</u> <u>0,066.7</u>			
4. PLANT:			Standard Deviation	Sample Size	Standard Deviation	Sample Size
<u>158.0</u> cm Plant Height (to tassel tip)			<u>15.30</u>	<u>06</u>	<u>173.3</u>	<u>04.13</u> <u>06</u>
<u>055.3</u> cm Ear Height (to base of top ear node)			<u>08.71</u>	<u>06</u>	<u>057.5</u>	<u>06.83</u> <u>06</u>
<u>012.4</u> cm Length of Top Ear Internode			<u>01.49</u>	<u>06</u>	<u>012.2</u>	<u>02.33</u> <u>06</u>
<u>0.0</u> Average Number of Tillers			<u>00.04</u>	<u>06</u>	<u>0.0</u>	<u>00.03</u> <u>06</u>
<u>0.9</u> Average Number of Ears per Stalk			<u>00.24</u>	<u>06</u>	<u>0.9</u>	<u>00.11</u> <u>06</u>
<u>5</u> Anthocyanin of Brace Roots: 1=Absent 2=Faint 3=Moderate 4=Dark 5=Very Dark					<u>4</u>	
5. LEAF:			Standard Deviation	Sample Size	Standard Deviation	Sample Size
<u>08.0</u> cm Width of Ear Node Leaf			<u>00.56</u>	<u>06</u>	<u>07.6</u>	<u>00.40</u> <u>06</u>
<u>67.8</u> cm Length of Ear Node Leaf			<u>03.24</u>	<u>06</u>	<u>78.4</u>	<u>03.89</u> <u>06</u>
<u>04</u> Number of leaves above top ear			<u>00.70</u>	<u>06</u>	<u>06</u>	<u>00.63</u> <u>06</u>
<u>19</u> Degrees Leaf Angle (measure from 2nd leaf above ear at anthesis to stalk above leaf)			<u>03.97</u>	<u>06</u>	<u>32</u>	<u>05.41</u> <u>06</u>
<u>03</u> Leaf Color (Munsell code) <u>5GY34</u>					<u>03</u>	<u>5GY44</u>
<u>1</u> Leaf Sheath Pubescence (Rate on scale from 1=none to 9=like peach fuzz)					<u>3</u>	
Marginal Waves (Rate on scale from 1=none to 9=many)						
Longitudinal Creases (Rate on scale from 1=none to 9=many)						
6. TASSEL:			Standard Deviation	Sample Size	Standard Deviation	Sample Size
<u>07</u> Number of Primary Lateral Branches			<u>02.12</u>	<u>06</u>	<u>05</u>	<u>01.64</u> <u>06</u>
<u>31</u> Branch Angle from Central Spike			<u>04.74</u>	<u>06</u>	<u>31</u>	<u>08.41</u> <u>06</u>
<u>51.0</u> cm Tassel Length (from top leaf collar to tassel tip)			<u>04.13</u>	<u>06</u>	<u>48.1</u>	<u>03.84</u> <u>06</u>
<u>5</u> Pollen Shed (rate on scale from 0=male sterile to 9=heavy shed)					<u>5</u>	
<u>14</u> Anther Color (Munsell code) <u>2.5R36</u>					<u>07</u>	<u>5Y94</u>
<u>14</u> Glume Color (Munsell code) <u>10RP36</u>					<u>01</u>	<u>5GY65</u>
<u>2</u> Bar Glumes (Glume Bands): 1=Absent 2=Present					<u>1</u>	
Application Variety Data			Page 1		Standard Variety Data	

7a. EAR (Unhusked Data):

<u>14</u>	Silk Color (3 days after emergence) (Munsell code)	<u>2.5R46</u>	<u>07</u>	<u>2.5GY96</u>
<u>01</u>	Fresh Husk Color (25 days after 50% silking) (Munsell code)	<u>5GY66</u>	<u>02</u>	<u>5GY66</u>
<u>21</u>	Dry Husk Color (65 days after 50% silking) (Munsell code)	<u>5Y91</u>	<u>21</u>	<u>2.5Y8.54</u>
<u>2</u>	Position of Ear at Dry Husk Stage: 1= Upright 2= Horizontal 3= Pendant		<u>2</u>	
<u>4</u>	Husk Tightness (Rate of Scale from 1=very loose to 9=very tight)		<u>4</u>	
<u>2</u>	Husk Extension (at harvest): 1=Short (ears exposed) 2=Medium (<8 cm) 3=Long (8-10 cm beyond ear tip) 4=Very Long (>10 cm)		<u>2</u>	

7b. EAR (Husked Ear Data):

	Standard Deviation	Sample Size	Standard Deviation	Sample Size
<u>13.0</u> cm Ear Length	<u>01.41</u>	<u>06</u>	<u>13.8</u> <u>00.75</u>	<u>06</u>
<u>32.7</u> mm Ear Diameter at mid-point	<u>01.03</u>	<u>06</u>	<u>39.2</u> <u>01.47</u>	<u>06</u>
<u>055.7</u> gm Ear Weight	<u>06.28</u>	<u>06</u>	<u>84.7</u> <u>10.48</u>	<u>06</u>
<u>13</u> Number of Kernel Rows	<u>00.52</u>	<u>06</u>	<u>13.3</u> <u>00.52</u>	<u>06</u>
<u>2</u> Kernel Rows: 1=Indistinct 2=Distinct			<u>2</u>	
<u>2</u> Row Alignment: 1=Straight 2=Slightly Curved 3=Spiral			<u>1</u>	
<u>08.3</u> cm Shank Length	<u>01.97</u>	<u>06</u>	<u>10.5</u> <u>01.76</u>	<u>06</u>
<u>2</u> Ear Taper: 1=Slight 2= Average 3=Extreme			<u>2</u>	

8. KERNEL (Dried)

	Standard Deviation	Sample Size	Standard Deviation	Sample Size
<u>08.0</u> mm Kernel Length	<u>00.00</u>	<u>06</u>	<u>09.3</u> <u>00.52</u>	<u>06</u>
<u>07.7</u> mm Kernel Width	<u>00.52</u>	<u>06</u>	<u>08.0</u> <u>00.00</u>	<u>06</u>
<u>05.5</u> mm Kernel Thickness	<u>00.55</u>	<u>06</u>	<u>04.5</u> <u>00.55</u>	<u>06</u>
<u>48.2</u> % Round Kernels (Shape Grade)	<u>35.16</u>	<u>06</u>	<u>50.2</u> <u>22.38</u>	<u>06</u>
<u>1</u> Aleurone Color Pattern: 1-Homozygous 2=Segregating			<u>1</u>	
<u>07</u> Aleurone Color (Munsell code)		<u>10YR7/2</u>	<u>07</u>	<u>2.5Y8/4</u>
<u>07</u> Hard Endosperm Color (Munsell code)		<u>10YR7/0</u>	<u>07</u>	<u>2.5Y8/4</u>
<u>03</u> Endosperm Type: 1=Sweet (Su1) 2=Extra Sweet (sh2) 3=Normal Starch 4=High Amylose Starch 5=Waxy Starch 6=High Protein 7=High Lysine 8=Super Sweet (se) 9=High Oil 10=Other_			<u>3</u>	
<u>21.2</u> gm Weight per 100 Kernels (unsized sample)	<u>02.40</u>	<u>06</u>	<u>22.67</u> <u>02.25</u>	<u>06</u>

9. COB:

	Standard Deviation	Sample Size	Standard Deviation	Sample Size
<u>20.3</u> mm Cob Diameter at mid-point	<u>00.52</u>	<u>06</u>	<u>26.0</u> <u>01.41</u>	<u>06</u>
<u>19</u> Cob Color (Munsell code)		<u>5Y91</u>	<u>14</u>	<u>10R46</u>

10. DISEASE RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant);
leave blank if not tested; leave Race or Strain Options blank if polygenic):

A. Leaf Blights, Wilts, and Local Infection Diseases

	Anthracnose Leaf Blight (<i>Colletotrichum graminicola</i>)	
4	Common Rust (<i>Puccinia sorghi</i>)	6
	Common Smut (<i>Ustilago maydis</i>)	
6	Eyespot (<i>Kabatiella zeae</i>)	7
4	Goss's Wilt (<i>Clavibacter michiganense</i> spp. <i>nebraskense</i>)	8
	Gray Leaf Spot (<i>Cercospora zeae-maydis</i>)	
	Helminthosporium Leaf Spot (<i>Bipolaris zeicola</i>) Race _____	
6	Northern Leaf Blight (<i>Exserohilum turcicum</i>) Race _____	4
	Southern Leaf Blight (<i>Bipolaris maydis</i>) Race _____	
	Southern Rust (<i>Puccinia polysora</i>)	
	Stewart's Wilt (<i>Erwinia stewartii</i>)	
	Other (Specify) _____	

B. Systemic Diseases

	Corn Lethal Necrosis (MCMV and MDMV)	
9	Head Smut (<i>Sphacelotheca reiliana</i>)	9
	Maize Chlorotic Dwarf Virus (MDV)	
	Maize Chlorotic Mottle Virus (MCMV)	
	Maize Dwarf Mosaic Virus (MDMV)	
	Sorghum Downy Mildew of Corn (<i>Peronosclerospora sorghi</i>)	
	Other (Specify) _____	

C. Stalk Rots

7	Anthracnose Stalk Rot (<i>Colletotrichum graminicola</i>)	8
	Diplodia Stalk Rot (<i>Stenocarpella maydis</i>)	
	Fusarium Stalk Rot (<i>Fusarium moniliforme</i>)	
	Gibberella Stalk Rot (<i>Gibberella zeae</i>)	
	Other (Specify) _____	

D. Ear and Kernel Rots

	Aspergillus Ear and Kernel Rot (<i>Aspergillus flavus</i>)	
	Diplodia Ear Rot (<i>Stenocarpella maydis</i>)	
9	Fusarium Ear and Kernel Rot (<i>Fusarium moniliforme</i>)	8
7	Gibberella Ear Rot (<i>Gibberella zeae</i>)	5
	Other (Specify) _____	

11. INSECT RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); (leave blank if not tested) :

Banks grass Mite (*Oligonychus pratensis*)
 Corn Worm (*Helicoverpa zea*)
 Leaf Feeding
 Silk Feeding
 mg larval wt.
 Ear Damage
 Corn Leaf Aphid (*Rhopalosiphum maidis*)
 Corn Sap Beetle (*Carpophilus dimidiatus*)
 European Corn Borer (*Ostrinia nubilalis*)
 1st Generation (Typically Whorl Leaf Feeding)
 2nd Generation (Typically Leaf Sheath-Collar Feeding)
 Stalk Tunneling
 cm tunneled/plant
 Fall Armyworm (*Spodoptera frugiperda*)
 Leaf Feeding
 Silk Feeding
 mg larval wt.
 Maize Weevil (*Sitophilus zeamais*)
 Northern Rootworm (*Diabrotica barberi*)
 Southern Rootworm (*Diabrotica undecimpunctata*)
 Southwestern Corn Borer (*Diatraea grandiosella*)
 Leaf Feeding
 Stalk Tunneling
 cm tunneled/plant
 Two-spotted Spider Mite (*Tetranychus urticae*)
 Western Rootworm (*Diabrotica virgifera virgifera*)
 Other (Specify) _____

12. AGRONOMIC TRAITS:

1 Staygreen (at 65 days after anthesis) (Rate on a scale from 1=worst to excellent)
 % Dropped Ears (at 65 days after anthesis)
 % Pre-anthesis Brittle Snapping
 % Pre-anthesis Root Lodging
 7.5 Post-anthesis Root Lodging (at 65 days after anthesis)
 Kg/ha Yield of Inbred Per Se (at 12-13% grainmoisture)

2

50.0

13. MOLECULAR MARKERS: (0=data unavailable; 1=data available but not supplied; 2=data supplied):

1 Isozymes

0 RFLP's

0 RAPD's

COMMENTS (eg. state how heat units were calculated, standard inbred seed source, and/or where data was collected. Continue in Exhibit D):

Please note the data presented in Exhibit B and C, "Objective Description of Variety," are collected primarily at Johnston, Ankeny, and Dallas Center, Iowa. The data in Tables 1A and 1B are from two sample t-tests using data collected in Johnston and Dallas Center, IA. These traits in exhibit B collectively show distinct differences between the two varieties.

The data collected in exhibit C was collected in 2000 and 2001 for page 1 and 2. There were 3 different planting dates planted for these trials. There are environmental factors that differ from year to year. Environmental temperature and precipitation differences during the vegetative and grain fill periods can impact plant and grain traits, and are a source of variability. The environmental conditions described above could result in larger standard deviations. The variation associated with environment to environment is normally higher than the variation associated within locations. Also, the ear and sizing traits can vary depending on how well pollinated the ears are and how consistent the weather is during the grain fill period. I have enclosed a table that shows monthly temperature and precipitation in 2000, and 2001.

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Exhibit ^C~~D~~. Temperature and Precipitation differences from Ankeny, IA

TEMPERATURE

YEAR	MAY	JUN	JULY	AUG	AVERAGE
1994	59.8	70.7	71.9	69.0	67.9
1995	56.2	69.4	74.3	76.9	69.2
1996	56.2	69.3	71.3	70.5	66.8
1997	53.5	70.6	74.1	69.6	67.0
1998	64.7	66.6	74.8	73.5	69.9
1999	60.7	69.7	78.7	70.5	69.9
2000	63.5	68.9	73.2	74.2	70.0
2001	61.3	69.0	76.7	74.2	70.3
2002	57.7	73.5	77.9	71.7	70.2

RAINFALL

YEAR	MAY	JUN	JULY	AUG	Total
1994	3.67	5.75	1.71	4.18	15.31
1995	5.04	4.19	2.94	2.87	15.04
1996	8.47	4.35	2.51	2.14	17.47
1997	4.32	3.27	4.10	1.36	13.05
1998	6.46	11.07	5.70	4.96	28.19
1999	6.46	4.54	4.45	6.55	21.85
2000	5.40	5.80	3.16	1.78	16.14
2001	5.72	3.87	2.05	1.92	13.56
2002	2.91	2.78	5.34	4.00	15.03

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

EXHIBIT E

STATEMENT OF THE BASIS OF OWNERSHIP

1. NAME OF APPLICANT(S) PIONEER HI-BRED INTERNATIONAL, INC.	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME PH5FW
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) 7301 NW 62nd AVENUE P.O. BOX 85 JOHNSTON, IA 50131-0085	5. TELEPHONE (include area code) 515-270-4051	6. FAX (include area code) 515-253-2125
7. PVPO NUMBER 200200177		

8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain: ☒ YES ☐ NO

9. Is the applicant (individual or company) a U.S. national or U.S. based company? ☒ YES ☐ NO

If no, give name of country

10. Is the applicant the original owner? ☒ YES ☐ NO If no, please answer one of the following:

a. If original rights to variety were owned by individual(s), is(are) the original owner(s) a U.S. national(s)?

☐ YES ☐ NO If no, give name of country

b. If original rights to variety were owned by a company(ies), is(are) the original owner(s) a U.S. based company?

☒ YES ☐ NO If no, give name of country

11. Additional explanation on ownership (if needed, use reverse for extra space):

PH5FW is owned by Pioneer Hi-Bred International, Inc.

Pioneer Hi-Bred International, Inc. (PHI), Des Moines, Iowa, and/or its wholly owned subsidiary Pioneer Overseas Corporation (POC), Des Moines, Iowa, is the employer of the plant breeders involved in the selection and development of PH5FW. Pioneer Hi-Bred International and/or Pioneer Overseas Corporation has the sole rights and ownership of PH5FW pursuant to written contracts that assign all rights in the variety to PHI and/or POC at the time such variety was created. No rights to this variety are retained by any individuals.

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See section 41(a)(2) of the Plant Variety Protection Act for definition.

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